IMPERIAL
DEPARTMENT OF AGRICULTURE
FOR THE WEST INDIES

REPORT

ON THE

AGRICULTURAL DEPARTMENT

ST. KITTS—NEVIS.

~~1922-23 and~~ 1923-24

ISSUED BY THE IMPERIAL COMMISSIONER OF AGRICULTURE
FOR THE WEST INDIES.

1925

[Price Sixpence.]

REPORTS

ON THE

BOTANIC STATION ECONOMIC PLOTS, AND AGRICULTURAL EDUCATION, ST KITTS—NEVIS

Annual Reports on Certain Economic Experiments conducted in connection with the Botanic Station, 1900-2.

Annual Reports on the Botanic Station for the years 1901 and 1902.

Annual Reports on the Botanic Station, Economic Experiments, and Agricultural Education for the years 1902-3 to 1921-22.

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LETTER OF TRANSMITTAL

Commissioner of Agriculture – to Administrator, St. Kitts-Nevis.

K. 258. Trinidad, 7th February, 1925.

Sir,

I have the honour to present herewith the Annual Report on the working of the Agricultural Department, St. Kitts-Nevis for the year ended March 31 1924.

2. The Report which in general follows the lines of previous reports includes the Report of the Agricultural Superintendent, St. Kitts, a Report on work in the Chemical Laboratory and a Report on the work of the Agricultural Department in Nevis.

3. The season under review has been characterised by the lack of rain and it, unfavourable distribution, which have had a bad effect on the crops of the Presidency, and this is particularly the case in Nevis.

4. The work of the Department in the field and Experiment Station has been in continuation of that of previous years in connection with sugar cane and cotton as well as with the crops of minor importance.

5. In the Chemical Laboratory the investigation in connection with the water supply of Basseterre and the liming of soil have been continued. The work on the combustibility of tobacco is of interest and likely to have a bearing on the tobacco industry of St. Kitts and the other West Indian Islands.

I have, etc.,

(Sgd.) H. M. LEAKE,

Commissioner of Agriculture
for the West Indies.

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STAFF OF THE AGRICULTURAL DEPARTMENT, ST. KITTS-NEVIS.

Agricultural Superintendent	F. R. SHEPHERD.
Assistant Agric. Supt. with Chemical duties	R. E. KELSICK.
Foreman Botanic Station	S. D. KNIGHT.
Agricultural Instructor (Nevis)	W. I. HOWELL

REPORT OF THE AGRICULTURAL DEPARTMENT, ST. KITTS-NEVIS.

For the year ended March 31, 1924.

WORK IN THE GARDENS AND OBSERVATIONS ON PLANTS.

The weather conditions of the past year were again most unfavourable being the worst on record.

This continuous dry weather has resulted in the loss of many of the older trees such as mangos and white cedars and every effort is being made to supply their places with other trees such as casuarinas and Antigua white-wood, which seems better able to resist dry weather.

In spite of the drought the lawns have been kept up and the tennis courts used by the several clubs.

Work in the Nurseries and Distributions of Plants

Attention has been paid to raising plants of ornamental and decorative nature such as palms, crotons, roses for supplying local demands and also timber and shade trees such as casuarinas and Antigua white-wood for which there has been some demand locally.

The actual number of plants distributed during the year was 1158 and consisted chiefly of casuarinas and Antigua white-wood. 33 lb. of seed of bread-and cheese were also distributed.

The nine olive plants of the "Mission Variety" mentioned in the report for previous year have been distributed, six to Anguilla, two to the Pall Mall Square, and one to Mr. P. Todd of the Lodge estate.

Plot Experiments at the Experiment Station, La Guerite.

Experiments with economic crops of various kinds have been continued as in previous years at the Experiment Station La Guerite, but again the results have been affected by the serious drought experienced.

Experiments with sugar-cane varieties, manuring of sugar-cane and selection of best strains of Sea Island cotton have engaged considerable attention.

The following list gives the distribution of cuttings and seeds from the Experiment station during the year.

Sweet Potatoes	...	cuttings	186,000
Cassava	...	do	2,340
Elephant grass ...	...	do	8,000
Sugar cane	...	do	131,800
Pea nuts	...	seed	20 lb.
Guinea corn	...	do	115 lb.
Cotton seed	...		1500 lb.
Onion slips	...		1000

PLOT A. SWEET POTATOES.

Sweet potatoes of the local variety known as "Todd" were planted in this plot on June 9 1923.

The vines in this plot were cut on many occasions for supplying cuttings for planting in Nevis and St. Kitts. The return of potatoes when reaped on January 29 1924 was affected by this, the yield from the plot being only 105 lb. or at the rate of 1050 lb per acre.

PLOT B.

Tobacco seed, Porto Rico variety, was sown in this plot to insure a good supply of seed for planting out nursery beds later on.

After this seed was reaped the plot was reprepared and seed of Hubam clover imported from the Germain Seed Co. was sown but this failed to germinate.

PLOT C.

Indian corn was planted in this plot on June 25 1925. The seed germinated well but owing to the serious drought the young plants withered and died.

Seed of Mellilotus indica imported from the Germain Seed Co. was sown in this plot but this failed to germinate.

Mazzagua Guinea corn was then sown on August 29 1923. but owing to the unfavourable weather a very small return of seed was reaped.

PLOT D.

Onion seed sown in nursery beds on September 10 1923. The slips were transplanted on October 23 into this plot and planted 6 inches square. On March 4 1924 these onions were reaped and gave a return of 480 lb. onions to the plot or at the rate of 9,600 lb. per acre.

PLOT E.

Sweet potatoes were reaped from this plot on June 11 1923. The return was very poor only 197 lb. to the plot This was due to unfavourable weather and to hte fact that a number of cuttings had been taken for planting.

This plot was planted in Spanish pea-nuts on June 13 after a careful preparation. The nuts were planted one foot square. On December 11 1923 these nuts were reaped yeilding only 35 lb. to the plot or at the rate of 350 lb. per acre. This very low return was due to unfavourable weather.

PLOT F.

Ten varieties of cassava were planted in this plot, on 4ft banks, 2 ft apart on December 13 1922. These plants grew strong and healthy but the dry weather later in the year seriously affected them and when reaped in October 1923 the returns were poor, and not worth recording, the highest, Black Stick only yielding at the rate of 650 lb, per acre.

Cuttings from these have been planted in Plot H. for further trial.

PLOT F. (ONIONS).

After the crop of cassava the plot was reprepared and onion slips planted out on October 23 1923. The growth at first was good but the lack of rain later on affected the development and when reaped on March 4 1924 the return was poor only at the rate of 4,500 lb. onion per acre.

PLOTS (G. M. N. & O).

These plots were all planted in tobacco from slips grown in the nursery with the object of raising a sufficient quantity of reliable seed for future planting. This was a success and a fair amount of good seed was secured.

As soon as the plants were maturing castor seed was planted between the rows of tobacco with the object of raising seed for distribution and also to determine what yield per acre could be expected from this crop.

As soon as the young plants came up the tobacco plants were buried in and for the first three months the castor plants were all that could be desired and commenced to bear freely. They were then attacked severely by an insect (*Corythuca gossypii*) which caused the leaves to dry up and fall. This considerably affected the yield and in addition the weather became very dry and unfavourable, causing many of the plants to die.

The total yield of clean seed from these plots which were just over $\frac{1}{2}$ acre in area amounted to 420 lb. or at the rate of 800 lb. seed per acre. The seed was of the large variety.

From the results of this experiment it would appear that castor will do fairly well on suitable land, but is liable to insect attacks on the leaves. The yield may be estimated at from 800 to 1,000 lb. seed per acre.

PLOT K. (YAMS).

This plot was prepared by making up the lands in "Hills" under which a good basket of farmyard manure was buried.

The yam cuttings after being passed through Bordeaux mixture were planted on June 11 1923.

The germination was excellent and shortly after the vines started to run the hills were staked up for the vines to run on.

This caused a very luxuriant growth even through the dry weather and on Jan. 28 1924 when the plot was reaped the returns were excellent.

The following table gives the varieties and the returns per acre.

Variety				Yield per acre.
Seal Top	...	...	...	12,650 lb.
Lisbon	...	...	...	7,590 „
Crop	...	...	...	7,690 „
Danish	...	...	...	5,830 „

Plot. L. Sweet Potatoes

This plot was planted in the local variety known as "Todd" vine, for the purpose of raising cuttings for distribution. Cuttings were freely taken when the vines were fit and distributed to local growers in St. Kitts and Nevis. The potatoes were reaped on June 9 1923 and gave a return of 900 lb. or at the rate of 9,000 lb. potatoes per acre.

Pea Nuts.

This plot was re-prepared and planted in the variety of pea-nuts known as Carolina Running on June 12, 1923. The weather being very unfavourable the return of nuts reaped was very small only 75 lb. from the plot or at the rate of 750 lb. per acre.

Manurial Experiments With Sea Island Cotton.

These experiments which have been carried on for the last nineteen years and on which results of the yield of seed cotton per acre from the different plots have been recorded in the reports on the Botanic and Experiment Stations St. Kitts—Nevis from 1904—05 to 1921—22, were discontinued this season owing to the unfavourable weather and the presence of pink bollworm.

The publised results of the past nineteen years point to the fact that under the conditions existing at the Experimient Station at La Guerite the application of artificial manures to cotton had little effect in increasing the yield per acre and now that the pink bollworm has made its appearance it was felt that this would be another factor, in limiting the accuracy of the returns reaped per plot. Hence these experiments were discontinued for this season.

Seed Selection.

The severe drought during the year seriously interfered with the plant breeding experiments. Owing to the low rainfall the cotton plants made very poor growth and many of the investigations which were originally planned had to abandoned.

Twelve plants of the strain C. P. 5. 7. 1. (referred to in last years report) were however selected for further trial in 1924.

Enough seed of this strain has been obtained for planting out a 20-acre field on the Government Cotton Seed Farm at La Guerite; it is also hoped to establish a small plot of the same strain on one of estates on the windward side of the island.

Government Cotton Farm.

Sixty acres of land was again planted in cotton on the Government cotton farm with the object of raising pedigree seed for sale to cotton growers in the Presidency.

By the courtesy of of the attorney in charge of Buckleys estate, 38 acres was ploughed and the remainder holed and and banked with the hoe. With the first rains in March the cotton was planted and as a precaution against drought and the pink bollworm the seed was sown 1 foot apart on the 4 feet banks. It was felt that the increased number of plants per acre would result in an increased yield in the event of a low rainfall and smaller plants and also that the plants would mature earlier.

The germintion was excellent and the young plants for the first month were all that could be desired but the serious drought of April and May checked the growth and the plants began to blossom and bear when very small.

First picking began on July 9 and continued until October 12 when the pink bollworm attacked so severely that no further return could be obtained.

The total crop of seed cotton picked amounted to 39,135 lb. which was an increase of about 8000 lb. on the yield of the previous year, this was due to the increased number of plants per acre.

The total crop of lint amounted to 9,926 lb. clean lint and 354 lb. stains, a total of 10,280 lb. lint or at the rate of 170 lb lint per acre. 22,206 lb. cotton seed, hand selected and fumugated with carbon bi-sulphide, was sold from the Farm to rowers in St Kitts—Nevis at the rate of 2d per lb.

Work in Connection with Insect and Fungus Pests and their Control.

Sugar-Cane.

Mosaic Disease.

A full account of the introduction of this disease into the Presidency was given in the Report for 1922-23 and the measures taken for its control and radication.

During the year under review careful inspections have been regularly paid to the infected areas and it is gratifying to record that the work of rogueing out the infected plants has been rigidly carried out on these estates with the result that it is difficult to find an infected cane in these areas. In no instance has the disease been detected on any other variety than the original one infected, the St Croix seedling S. C. 12. 04. and this is a matter for congratulation. Cuttings have been distributed from the infected area for planting on other estates and in every instance these have been inspected and no case of infection has been found.

Moth Borer.

This pest was very prevalent but the canes were so affected by the drought that prevailed that it was difficult to distinguish between loss due to the moth borer and that due to the weather. Under normal conditions the loss due to this pest does not seem so great and steps are being taken to try and get some idea of the actual damage done, by experiments conducted during the reaping season.

Cotton.

The cotton worm (*Alabama argillacea*) was very prevalent and in certain districts large quantities of poison were used for keeping it in check, but no actual damage was done to the crop.

Pink Bollworm (*Pectinophora gossypiella*). This pest did very little damage to the first picking of cotton but later in the season was present in large numbers and seriously affected the later planted cotton. The most effectual remedy for this pest, in fact the only practical one, is rigid cleaning up and burning of all old cotton plants, inspection of the fields before new crops are planted, cleaning-up of all cotton storehouses and ginneries by a given time, all under the supervision of a Cotton Inspector. If these precautions are properly carried out there is no reason why a first picking of cotton should not be obtained without any appreciable loss. Another very important factor is that if possible all cotton should be planted at the same time, or in the same month, as all cotton planted at a later period is always affected at an earlier stage and the loss is very great. In other words it is quite possible with proper precautions and fair season to grow a good crop of cotton in spite of the presence of the pink bollworm.

Cotton Stainers. These were only seen at the close of the season and did not affect the return of cotton. The close season and early planting of cotton keeps this pest in check.

Leaf blister mite. This pest, as with the Cotton Stainer, is seldom found until late in the season, due to the effect of the close season and of the destruction of all old plants.

Disinfection of Plants.

In accordance with the provisions of the Plant Protection Ordinance No. 3 of 1907, eighty packets of seeds and plants were inspected at the Botanic Station and, where necessary, fumigated with carbon bisulphide.

PLANT LEGISLATION.

The following is the legislation in force in the Presidency dealing with plant protection to March 31 1924 :—

Ordinance No. 3 of 1907, orders all plants and seeds imported to be sent to the Botanic Station to be examined by officer-in-charge and disinfected where necessary.

Ordinance No. 2 of 1923. An Ordinance for the prevention and eradication of diseases and pests affecting vegetation. Plant Protection Ordinance 1923.

Proclamation of November 16 1920. Prohibits the importation into the Presidency of sugar canes and parts of sugar canes from all countries save under license given by the Governor.

Proclamation of December 13, 1920. Prohibits the importation of all cotton seed int cotton, and all packages coverings or bags for any cotton seed, cotton lint, or seed cotton from all countries and places save with the written permission of the Governor.

Ordinance No. 7 of 1918. An Ordinance to make provision for the eradication of the pest known as the cotton strainer.

Ordinance No. 8 of 1918. An Ordinance to regulate the planting of cotton, and to provide for the destruction of cotton plants.

Ordinance No. 6 of 1923. An Ordinance further to amend the Cotton Ordinance No. 8 1918, defining an infectious plant and providing for the inspection of land before a new crop is planted after cotton.

Proclamation of July 29 1922. Prohibits the importation of all lime plant or parts of lime plants including lime fruit from British Guiana, Trinidad and Dominica.

Proclamation of date January 5 1923. Prohibits the importation of banana suckers from all countries save and except from the Presidencies of the other Leeward Islands, Grenada, St. Vincent and Barbados.

Proclamation of date of November 13 1923. prohibiting the importation of growing or sprouted coconuts from St. Vincent owing to the presence of Red Ring disease.

Proclamation Under Ordinance No. 8 of 1918 fixing the close season for cotton in Nevis from January 1 to January 31 both days inclusive.

Proclamation of date January 21. 1924 declaring the "Okra" plant an infectious plant within the meaning of the Ordinance.

Regulations made May 25 1923 under Section 22 of Plant Protection Ordinance 1923 for control of Mosaic Disease, of sugar cane.

Proclamation of date May 9 1923 declaring Mosaic disease of sugar cane to be a disease within the meaning of the Plant Protection Ordinance.

Proclamation of date May 9 1923 fixing the close season for cotton in the island of Anguilla, from May 16 to May 31, both days inclusive.

Laws relating to Animals in existence in St. Kitts-Nevis.

Ordinance No. 2 of 1917. An ordinance to consolidate and amend the law relating to contagious disease among animals. Appointment of inspector, manner of dealing with animals suffering from diseases and disinfection of infected places Conditions under which animals may be imported.

Order in Council of date January 30. 1922 rescinding order of date September 15, 1921 prohibiting the importation of dogs from other places outside the Presidency.

Rules and Regulations made December 13 1923, under Health Ordinance No. 12 of 1902, for the keeping of animals within the towns of Basseterre and Sandy Point.

Order in Council of date October 13 1923, rescinding Order made October 5 1921, prohibiting the landing of animals from the islands of St. Eustatius, Saba, St. Bartholomew and St. Martins.

Order in Council of date September 13, 1923, rescinding Order made July 12 1923, declaring the island of Santo Domingo an infected area.

Order in Council of date January 16 1923, rescinding Order made September, 13 1922, declaring the island of Nevis an infected area owing to existence of anthrax.

Ordinance No. 11, of 1922. An ordinance to amend the Diseases of animals Ordinance of 1917, so that poultry shall be excluded in dealing with an infected area in outbreak of anthrax.

Proclamation of date May 8 1923, under Ordinance No. 6 of 1913, entitled the "Wild Birds Protection Ordinance," 1913. fixing the period from and between February 1 and September 30 both days inclusive, as the close season for wild pigeons.

Progress in the Chief Industries.

THE SUGAR INDUSTRY.

The exports of sugar and syrup from the Presidency for the year 1923 were as follows :—

Sugar (crystals)	...	...	10,356 tons
Sugar (muscovado)	...	...	44 tons
Syrup 95,048 gallons equal to		...	317 tons Sugar.
Total exported	...	...	10,717 tons

This was an increase on the exports of 1922 of 1,069 tons.

The total value of the sugar exported with syrup and molasses was £278,866 which was an increase of £122,965 on the value of sugar exported in 1922. This was due to the rise in price of crystals from £16 in 1922 to £26. 3. 3. in 1923.

During the year the railway line of the St. Kitts (Basseterre) Sugar Factory was extended on the northern side of the island for about 3 miles, as far as La Vallee estate. This extension and the transport of canes by sailing boats from Godwins pier makes it possible for all the estates to send their canes to the factory and is a very important development of the sugar industry.

Experiments with varieties of sugar-cane have been carried on at different estates in St Kitts and Nevis and manurial experiments on sugar-cane have been conducted on two estates in St. Kitts, Brighton and West Farm.

Results of these experiments are published in a separate report prepared by the Government Chemist and Superintendent of Agriculture for the Leeward Islands.

A very important addition was made to the sugar cane seedlings grown in the island by the importation from Honolulu of cuttings of the Hawaii seedling known as H. 109.

These cuttings were obtained through the courtesy of Mr. R. A. Macfie of San Domingo and was the result of a visit paid to St. Kitts by Mr. Julius Matz of the Central Porvenir Santo Domingo to obtain cane cuttings for planting.

The cuttings were packed in charcoal in hermetically-sealed tins and enclosed in a case. The case was inspected by the local Bureau of Plant inspection in

The case arrived in St. Kitts via Barbados on November 21 after a voyage of two months. The cuttings when received were in excellent condition and were at once planted out in the Experiment station under strict quarantine. In accordance with local regulations a written permit was given by the Administrator for the landing of these cuttings. The thanks of the Agricultural Department are due to Mr. Macfie for his kindness in obtaining these cuttings and also for his liberality in paying all expenses in connection with the shipment which amounted to $43. 77.

Twenty three cuttings out of sixty four received, germinated and have developed into fine stools of canes. Cuttings from these will be distributed among the planters in the next planting season.

EXPORTS OF SUGAR.

Year	Tons	Year	Tons
1900	7,494	1913	11,312
1901	13,146	1914	9,946
1902	16,624	1915	8,341
1903	13,511	1916	16,106
1904	12,225	1917	15,048
1905	12,042		
1906	15,191	1918	9,105
1907	14,178	1919	11,015
1908	11,044	1920	12,483
1909	12,027	1921	10,592
1910	12,510	1922	9,648
1911	11,139	1923	10,717
1912	10,554		

THE COTTON INDUSTRY

There was an increase in the area planted in cotton in the Presidency during the year 1923-24 but the increase was chiefly in Nevis.

The total estimated area planted was as follows—

St Kitts	...	1000 acres
Nevis	...	2500 acres
Anguilla	...	500 acres (estimated)
Total.	...	4000 acres

St Kitts.

In St Kitts the close season being the month of February all cotton was planted early in March wherever possible with the first rains.

The germination of the seed was excellent but the serious drought of the months of April and May retarded the growth of the young plants and blossoming and bolling began when the plants were very small.

The pink bollworm did not do much damage to the first picking but later on in the year the percentage of bolls attacked was very great amounting in some instances to 80 per cent.

The total output of the island was 133,900 lb. lint or about an average of 134 lb. lint per acre.

Nevis.

A report of the industry in Nevis is given in the report of the Agricultural Instructor of that island. The season was a most unfavourable one and the return of lint per acre hardly exceeded 50 lb.

Anguilla.

The cotton industry in this island is in a very precarious condition and very little interest is being taken in it owing to the dry weather and the attacks of pests of all kinds. The chief planter Mr. C. Rey, to whom the credit of establishing this industry is due, was so much discouraged by constant failure that he has practically given up the cultivation of cotton.

Exports of Cotton.

The following table gives the exports of cotton lint from the Presidency in lb. for the twenty years ended September 30 1923.

Year.	St. Kitts. lb.	Nevis. lb.	Anguilla. lb.	Total. lb.
1904	24,197	28,449	1,661	54,307
1905	78,219	114,721	31,452	254,392
1906	120,379	120,168	80,650	321,197
1907	180,917	96,402	61,666	338,985
1908	241,006	211,431	76,200	528,637
1909	207,146	104,250	49,320	360,716
1910	231,150	129,973	43,400	404,523
1911	329,322	344,395	148,595	822,312
1912	332,168	165,329	97,142	594,639
1913	374,594	166,477	112,138	653,209
1914	372,638	268,542	94,372	735,547
1915	397,567	305,154	33,750	736,471
1916	121,859	99,173	49,620	280,652
1917	106,265	196,915	49,399	352,579
1918	2,457	187,748	652	190,857
1919	442,681	307,212	47,869	797,762
1920	288,720	292,627	61,543	642,890
1921	23,970	422,120	nil.	446,090
1922	228,612	225,851	50,120	504,583
1923	29,256	510,919	nil.	540,175

The crop return of Cotton for the year ended Sepember 30 1923 was 252,928 lb.

TOBACCO INDUSTRY

The experiment in growing tobacco on a commercial scale was continued and five acres of land was planted in tobacco at La Guerite Experiment station and small acres at West Farm and Milliken estate by Hon. A. M. Reid.

The services of the tobacco expert Mr E. J. Brooks were re-engaged for another year by the Government and he arrived in St Kitts early in October 1923, accompanied by a competent cigar roller who had been engaged for a term of three years by the Jamaica Government on behalf of the St Kitts-Nevis Government. This cigar roller will be paid by schedule rates for rolling cigars and at the rate of 8/4 per day when not employed in making cigars.

Cigar boxes, labelled "Londres", "1923" and "Cheroots", were imported from the United States and specially designed labels were ordered for the boxes and for

the cigar bands so as to give them an attractive appearance in the market. The cigars themselves being called La Guerite.

The growth of the tobacco at La Guerite was all that could be desired but at Milliken and West Farm the returns were very small and the leaves very much damaged by the wind and transport.

All this tobacco after being reaped and dried in the drying house was headep and packed in 'pilons" awaiting fermentation later on.

Since the arrival of the cigar roller, cigars have been made daily of the different kinds; and up to March 31 1924 the following were turned out : "Londres" "5,875 "1923" 2,050. "Cheroots" 4,975.

Samples of these cigars were distributed locally for advertisement and a commercial agent was appointed to sell the cigars on a small commission. A consignment of these cigars, 5 boxes of each kind, were sent for exhibition at the British Empire Exhibition at Wembley and a sample of leaf tobacco.

So far these cigars have not met with the approval of the general public and the sales of the higher priced cigar have been somewhat limited.

An attempt is being made to reach the man in the street by the making of a cheaper cigar which can be sold locally at 6/ per 100 or 1d each.

The following table gives the number of cigars rolled of each kind and the stock in hand on March 31 1923.

	Londres.	1923.	Cheroots.
Rolled to March 31	5,875	2,050	4,975
Distributed for advertisement ...	975	50	175
	4,900	2,000	4,800
Sent to British Empire Exhibition ...	250	125	500
	4,650	1,875	4,300
By sales and in hands of Local Agent ...	2,600	225	2,400
In stock at March 31	2,050	1,650	1,900

Return of Agricultural Produce exported from the Presidency of St. Kitts-Nevis for the year ended December 31 1923.

Article.	Quantity.	Value. £
Sugar	10,400 tons	272,123
Syrup	95,048 gallons	3,960
Molasses	413,658 Do	2,783
Cotton	625 041 lb. lint	54,409
Cotton seed	255 tons	1,510
Cotton seed oil	7,370 gallons	761
Copra	12,650 lb.	154
Coconuts	438,450 nuts	1,995
Salt	792 tons	626
Tamarinds	78 barrels	64
Hides		520
Horses	6	145

Details of Administration.

EXPENDITURE, RECEIPTS, SALES, OF PLANTS, ETC.

The expenditure for the year was as follows :—

	£	s.	d.
Salaries (including commission £23.15.10, on profits of cotton farm)	1,115	0	9
Travelling expenses (Agricultural Superintendent to Nevis)	19	1	5
Horse allowance (Curator and Agricultural Instructor)	76	0	0
Upkeep Botanic Station	214	0	1
Sugar-cane, cotton, and other experiments	271	0	8
Experiments Nevis	115	0	11
Contingencies	7	10	0
Apparatus and Chemicals (Laboratory)	92	16	9
Contingencies (Laboratory)	13	15	11
Telephones	36	0	0
Cotton Inspectors Nevis and Anguilla	90	10	0
Destruction, cotton pests, and wild cotton	120	17	4
Type writer experiment Station Nevis	11	13	4
Hedge, Cemetery, Nevis	7	0	10
Cultivation Government cotton Farm	570	18	3
Tobacco Expert salary	172	5	8
Passage to Jamaica	26	8	6
Tobacco Industry	517	5	0
Contribution British Empire exhibition	293	8	11
Total expenditure	£3,768	14	4

RECEIPTS.

	£	s.	d.
La Guerite—Economic plots	275	0	5
Botanic Station—sale of plants	3	11	0
Nevis Experiment Station—produce and cotton	39	17	4
Government Cotton Farm	1,971	16	8
Sale of cigars	12	13	5
Total receipts	£2 302	18	10

STAFF CHANGES.

The Foreman Mr. S. D. Knight acted as Store Clerk in the Public Works Department from October 15 1923 to May 31 1924 and W. Ottley acted as Foreman in his place.

CORRESPONDENCE AND DISTRIBUTION OF INFORMATION OF AGRICULTURAL MATTERS.

The usual correspondence has been carried on departmentally in connexion with the work of the Department.

Copies of publications of the Imperial Department of Agriculture have been distributed to persons interested in the Presidency.

The Agricultural and Commercial Society of which the Agricultural Superintendent is Honorary Secretary, held ten meetings during the year, the chief subjects under discussion being—

1. Outbreak of Mosaic disease of sugar cane and means taken for its control 2. Discussion on resolution by Mr. Geo. Moody Stuart on De-federation of the Leeward Islands, 3. Visit of Hon. F. M. B. Fisher and address on the British

Empire Exhibition. Resolution recording the Society's appreciation of its object and asking the Government to insure the adequate representation of the Presidental 4. Resolution on the appointment of Parliamentary Committee to take interest in West Indian affairs.

Exhibitions.

The visit of Hon. F. M. B. Fisher to St Kitts in March 1923, when he addressed a meeting of the Agricultural and Commercial Society, aroused interest in the British Empire Exhibition to be held at Wembley early in 1924, and a resolution was passed by the Society asking the Government to ensure the adequate representation of the Presidency at the exhibition.

The necessary funds for providing a stall for St Kitts-Nevis in the Leeward Islands section at the exhibition were voted by the Government and a collection of articles representing the produce of the Presidency were collected and forwarded in February 1924 to the Commissioner West Indian and Atlantic Section, Wembley. The exhibit consisted of the following articles :—

Sugar, syrup, molasses, rum, sea island cotton, seed cotton and lint cotton, cotton seed meal and cake, cotton seed oil, coconuts and copra, cigars and leaf tobacco, salt, castor seed and oil, honey and beeswax, peanuts, starches and meals, native preserves, native made baskets and mats, native pickles in brine.

A collection of post cards and souvenirs illustrating the views of St. Kitts Nevis.

Handbook of St Kitts-Nevis by Katherine Jane Burdon.
50 Handbooks of general information of the Presidency.
25 Guide books to Brimstone Hill.

These were later supplemented by a collection of fancy needlework and beard work from the Womens Self Help Association, St. Kitts and large photographs illustrating the scenery of St. Kitts.

Stock

The Thorough bred Stallion, Sorghum, imported in 1921 by the Government for improving the local breed of horses is kept at West Farm estate and is in good condition. His services are appreciated by the owners of mares.

PUBLICATIONS RECEIVED

The following publication have been regularly received and are now gratefully acknowledged.

The Journal of The Imperial College of Tropical Agriculture, Kew Bulletin, Bulletin of the Agricultural Department of Trinidad and Tobago. Journal of the Agricultural Society, Jamaica. Report of the local Department of Agriculture, Barbados. Report of the Mauritius Department of Agriculture with other publications, Journal de la Station Agronomique, Guadeloupe, The Australian Sugar Journal, The Louisiana Planter. Facts about Sugar. Report of Porto Rico Experiment Station, Experiment Station Record United States Department of Agriculture, Bulletins of the Experiment Stations United States Department of Agriculture.

OFFICIAL VISITS.

His Excellency the Governor visited the Experiment Station at La Guerite on two occasions and evinced great interest in the tobacco industry.

Four Post Graduate Students from the Tropical College of Agriculture Trinidad visited St. Kitts in October 1923 and were engaged studying matters in connection with cotton for the short time allowed them.

Hon. A. E. Collens, F.I.C., F.C.S., visited the Presidency in April, October, December, visiting estates in connection with Mosaic disease, planting of castor seed, and investigating the water supply in Nevis.

METEOROLOGICAL RETURNS.

RAINFALL AT THE BOTANIC STATION, ST. KITTS.

Month	Rainfall in inches.	Number of days on which rain fell.	Maximum fall in one day.
1923			
April	1·07	7	·32 (1st)
May	·07	2	.06 (16)
June	3·74	13	1·16 (7th)
July	2·72	6	1·34 (1st)
August	4·31	11	·47 (1st)
September	3·64	9	1·34 (8th)
October	7·25	16	1·91 (16th)
November	·62	3	·25 (1st)
December	2.79	10	·80 (14th)
1924			
January	3.15	19	·66 (6th)
February	3·02	16	·48 (17th)
March	·24	2	·19 (6th)
Total	32·50	114	

The rainfall for the year ending December 31 1923 was 33·07 inches. This is the lowest rainfall on record and 11·23 inches below the average for 22 years at the Botanic Station.

TEMPERATURE.

Readings of the maximum and minimum thermometers and the wet and dry bulbs are taken daily at 9 a.m. and 3 p.m. The mean monthly temperature was 78·3° The maximum reading was 91° on May 30. The minimum was 65° on March 5.

Corrected barometor readings are taken daily at 9 a. m. and 3 p.m. A table is attached with meteorological summary for 1923.

RAINFALL AT THE BOTANIC STATION, FOR THE LAST 22 YEARS.

Month.	1902.	1903.	1904.	1905.	1906.	1907.	1908.	1909.	1910.	1911.	1912.	1913.	1914.	1915.	1916.	1917.	1918.	1919.	1920	1921.	1922.	1923.
January ..	...	0·32	3·51	2·15	2·25	1·45	1·29	7·31	2·41	4·98	2·69	6·67	3·37	2·34	3·82	1·76	1·01	2·80	5·04	6·49	2·53	1·99
February ..	...	1·30	2·01	2·41	1·61	1·99	1·81	2·85	1·27	4·51	1·40	4·06	2·76	1·64	3·62	2·81	4·71	2·00	2·97	3·97	1·95	1·18
March ...	...	1·83	2·03	1·43	2·57	0·67	5·50	1·92	1·71	2·30	1·15	2·91	1·87	0·48	3·13	1·32	3·11	1·99	1·49	3·61	2·13	3·67
April ...	3·30	2·08	1·94	2·41	3·79	0·97	0·75	1·12	1·83	1·36	3·01	2·01	7·18	9·63	1·52	2·38	0·95	7·03	...	2·61	3·64	1·07
May ...	11·75	1·12	2·03	1·15	3·35	4·63	2·05	1·13	0 90	4·37	1·06	5·05	8·33	1·86	5·84	1·96	5·27	1·31	1·23	·91	·92	·07
June ..	4·76	2·43	2·19	5·20	9·39	2·80	2·86	5·62	3·45	2·25	2·86	0·82	3·19	3·19	3·21	5·55	1·68	3·41	3·08	1·27	2·21	3·74
July ...	4·59	2·23	3·89	3·40	1·86	2·57	3·39	4·46	1·64	3·31	2·59	1·97	5·07	11·21	8·23	2·77	2·33	7·96	2·16	4·07	3·23	2·84
August ..	1·31	1·23	6·95	3·23	0·58	2·15	6·41	8·13	4 47	2·18	2·09	3·19	2·05	5·22	8·23	2·75	2·63	2·46	3·45	3·02	4·61	4·21
September ...	4·22	4·22	8·38	5·03	18·36	2·42	3·98	1·99	8·51	3·19	7·61	4·73	1·85	4·39	4·01	6·71	6·79	3·72	4·11	4·10	8·09	3·64
October ...	2·80	7·46	3·75	3·63	2·50	10·77	4·33	3·01	3·74	4 92	7·13	3·93	3·61	4·81	15·89	2·79	5·15	8·00	4·59	6·58	3·10	7·25
November ..	7·36	3·78	2·25	3·75	3·51	1·86	7·99	6·92	4·20	3·02	8·80	4 28	8 96	7·27	5 94	1·93	8·96	4·84	3·67	3·35	2 18	·62
December ...	4·66	4·45	2·32	2·11	5·94	4·13	4·23	4·91	4·51	6·37	2·40	3·95	2·63	8·37	2·47	3·70	4·74	5·17	4·39	2·62	2·59	2·79
Total ...	45·38	36 05	44·62	36·10	55·71	36·41	44·62	49·79	38·67	43·09	42·89	43·63	50·87	60·11	65·94	36·43	47·33	50·69	36·18	42·90	37·21	33·07

Average for 22 years. 44·30 inches.

RAINFALL RETURNS, ST. KITTS, 1923.

Station.	Jan.	Feb.	March	April.	May	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Totals
Wingfield ...	1·34	1·79	3·90	1·51	·56	4·91	3·38	7·75	3·06	9·26	3·25	4·09	58·41
Willetts ...	1·76	2·18	4·03	2·51	·92	8·01	4·41	3·76	4·51	9·65	5·60	5·52	52·66
Brothersons ...	1·57	4·93	2·26	1·72	·63	7·89	2·87	7·86	2·11	8·97	1·63	3·79	46·33
Stone Fort ...	2·74	2·82	5·11	3·35	·18	6·05	3·46	3·66	4·15	8·35	1·00	4·43	45·30
Belmont ...	1·34	1·79	3·90	1·51	·56	4·91	3·58	7·75	3·06	9·26	3·25	4·09	44·80
Bourkes ...	3·30	1·68	5·05	2·27	–	4·83	5·33	3·54	1·40	10·41	1·51	3·25	43·47
Parsons ..	1·29	1·34	3·53	2·08	·00	5·39	4·41	4·78	2·94	10·42	3·16	2·89	42·83
Bellevue ...	1·52	2·00	5·12	2·40	·13	4·85	5·37	3·61	3·81	8·17	1·56	3·96	42·50
Sir Gillies ...	1·30	3·25	5·60	2·00	–	5·60	2·45	4·30	1·65	8·15	2·30	4·10	40·70
Caines	·55	2·11	3·97	2·47	–	4·48	4·10	3·30	2·70	8·59	1·35	4·03	37·65
Cranstouns ...	1·39	1·61	3·29	1·91	·22	4·86	2·11	5·25	2·11	8·56	1·50	4·14	36·95
Lodge	1·00	2·20	2·75	2·07	·21	4·57	2·38	4·24	4·13	7 45	2·21	3·05	36·26
Stapleton ...	·82	1·39	3·23	1·32	·19	5·88	2 06	2·52	5·43	5·95	3·19	3·66	35·67
West Farm ...	2·12	1·15	4·88	1·46	–	5·54	1·72	2·34	3·79	7·71	·48	3·55	34·87
Mansion ...	1·09	1·39	2·03	1·64	·26	3·48	4·02	3·62	2·41	8·75	2·53	3·20	34·42
Molineux ...	1·00	1·76	1·76	2·26	·59	4·37	3·18	3·34	3·34	7·18	1·52	3·23	33·53
La Guérite ...	1·58	1·48	3·94	1·66	·12	5·97	1·91	2·93	3·61	7·77	·32	2·74	34·03
Estridge ...	·75	1·77	2·72	1·17	·22	3·46	4·20	3·15	3·68	7·79	1·05	3·07	33·03
Brighton ...	·93	2·18	2·21	1·09	·26	4·15	2·12	3·41	4·07	6·37	2·81	2·51	32·11
Douglas ..	1·41	1·07	3·51	1·46	–	5·17	2·14	2·37	4·53	6·54	1·11	3·35	32·66
Buckleys ...	1·40	1·39	4·04	1·30	–	5·41	1·29	2·60	3·11	7·58	·38	3·49	31·99
Frigate Bay ...	1·87	2·06	4·31	1·94	·19	4·97	1·67	2·56	3·23	5·15	·71	2·30	30·96
Lower Bourryau	1·19	1·86	2·77	1·27	·21	2·58	2·55	3·15	3·58	5·72	·88	3·82	39·36
St. Kitts Factory	1·17	1·29	2·60	1·71	·16	4·90	1·91	1·67	3·17	7·33	·61	1·90	28·42
Mills	1·07	1·21	2·29	1·40	·12	2·62	2.76	2·64	3·27	6·00	1·18	2·85	27·41
Hermitage ...	1·01	1·84	2·01	1·53	·05	3·10	1 80	2·43	2·54	5·11	2·33	2·34	26·09
Pond	1·03	·40	4·58	·85	–	3·50	2·85	2·33	2·50	6·52	·25	1·13	25·94
Cunningham ...	·83	1·25	1·35	1·06	·19	3·25	1·92	2·06	2·21	4·81	3·29	2·99	24·41
Conaree	1·04	1·33	2·54	1·21	·13	4·30	·90	1·78	1·45	6·50	1·30	1·30	23·78
Canada	·50	·57	1·88	·93	·05	3·14	1·37	2·06	1·62	4·70	2·57	2·20	21·59
Botanic Station	1·99	1·18	3·67	1·07	·07	3·74	2·84	4·21	3·64	7·25	·62	2·79	33·07

Mean Rainfall 31 Stations 35·52 inches.
" " 17 Windward 40.9 "
" " 14 Leeward 28.9 "

METEOROLOGICAL SUMMARY, 1923.

KEPT AT THE GOVERNMENT LABORATORY, LA GUERITE, ST. KITTS.

Month.	Thermometer Fahr. Dry		Thermometer Fahr. Wet.		Relative Humidity. per cent.		Thermometer. Max.	Thermometer. Min.	Barometer Corrected Reduced to 32°F and sea level and corrected for latitude.		Rainfall.	Barometer Corrected.		Thermometers. Highest Max.	Thermometers. Lowest Min.
	9 a.m.	3 p.m.	9 a.m.	3 p.m.	9 a.m.	3 p.m.			9 a.m.	3 p.m.		Highest	Lowest.		
January	78·7	78·2	70·5	70·2	63·0	61·0	79·7	69·7	30·025	29·949	1·58	30·075	29·903	83	68
February	79·5	78·6	70·8	70·3	61·5	62·5	81·4	70·5	30·075	30·004	1·48	30·165	29·905	83	68
March	79·2	78·5	71·1	70·5	63·5	64·0	81·9	69·0	30·061	29·984	3·94	30·146	29·910	85	65
April	81·9	79·9	71·8	71·3	56·5	62·0	83·8	71·1	30·008	29·974	1·66	30·110	29·860	87	69
May	85·1	84·5	74·3	73·6	57·0	55·0	87·7	73·8	29·992	29·935	0·07	30·087	29·847	91	72
June	82·9	82·0	75·2	75·1	64·5	67·5	85 1	73·7	30·046	29·985	5·97	30·103	29·912	90	68
July	83·8	83·4	76·1	75·8	64·5	65·0	83·6	75·0	30·022	29·973	1·91	30·085	29·917	89	70
August	83·8	84·0	76·6	76·2	67·0	64·0	87·1	75·1	30·009	29·950	2·93	30·095	29·879	89	73
September	85·6	85·0	76·9	76·3	62·0	62·0	86·8	75·2	29·955	29·893	3·61	30·077	29·834	89	72
October	83·5	83·5	77·2	76·9	70·5	69·0	86·0	73·4	29·918	29·838	7·77	30·021	29·707	89	70
November	83·6	83·1	75·1	75·0	62·0	63·5	8·53	72·2	29·941	29·873	0·32	29·998	29·819	88	70
December	8·04	79·3	71·9	71·1	62·0	63·0	82·1	71·2	29·990	29·921	2·88	30·075	29·810	85	68
Means for the year	82·3	81·7	74·0	73·5	62·8	63·4	84·2	72·5	30·004	29·940	34·12 Total				

Highest Maximum Temperature 91°F. on May 30. Lowest Minimum Temperature on January 3, 4, 6, 26, 31, February 13, June 7 and December 3, 21. Highest Barometer (corrected) 30·165 on February 6. Lowest Barometer (corrected) 29·707 on October 23. Greatest Rainfall in 24 hours = 2·49 on October 16. Earthquakes = 2 on December 28 and 31.

Report on Work in The Chemical Laboratory

BY

R. E. KELSICK.

The following samples were dealt with in the Laboratory during the year :—

Experiment Cane Juices	165
Fancy Molases	8
Milk (Police samples)	314
Waters	14
Sheep Manure	2
Grasses, feeding value	2
Tobacco, complete analysis of ash	3
Soils	10
Artificial Fertilizers	8
Canes Juices, phosphoric acid content	24
Seed Cotton	35
Total	581

MILK SUPPLY.

During the year the Inspector of Police submitted three hundred and fourteen samples of milk for analysis and report.

These samples were purchased in Basseterre, in the country districts of St. Kitts and in Nevis. Fourteen of these, or somewhat over four per cent, were found to have been adulterated with water. So far as dilution with water is concerned, the milk supply may be regarded as satisfactory.

FODDERS.

The Elephant grass and Guatemala grass grown in the experiment station were analysed for their food value. The following analytical figures were obtained and are expressed on the moisture free material :—

	Elephant Grass (Pennisetum purpureum) Per cent	(Tripsacum laxum) Guatemala Grass Per cent
Crude proteins	5·3	2·9
Ether extract	1·9	2·7
Crude fibre	38·8	29·6
Carbohydrates (by difference)	42·8	57·3
Ash	11·2	7·5
Food units	61	71
Nutrient ratio	1:9	1:22

It will be seen from these figures that Elephant grass is superior to Guatemala grass as a fodder. Elephant grass is now grown on several estates in St. Kitts.

BASSETERRE WATER SUPPLY.

The following table shows the results of analyses of the water supplied to the town of Basseterre during the month of August, 1923:

	Total Solids.	Chlorine.	Nitrites.	Nitrates.	Free Ammonia.	Alluminoid Ammonia.	Oxygen consumed in 4 hours.
			Parts per	*100,000*			
Reservoir 3. VIII. 23	13·8	2·0	absent	trace	·016	·022	·099
Weir Gauge 12. VIII. 23	14·6	2·0	„	absent	·003	·008	·091
Weir Intake 12. VIII. 23	15·4	2·0	„	„	trace	·005	·113
Reservoir 12. VIII. 23	14·2	2·0	„	„	·004	·013	·127
Reservoir 31. VIII. 23	14·7	2·0	„	„	·002	·007	·140
Reservoir (after cleaning)	12·4	1·9	„	„	absent	·004	·076

As stated in last year's report water to supply Basseterre is piped from Hutchinson's Weir to an open reservoir on the government lands at La Guerite. This water is not filtered before entering the reservoir. There are serious objections to the storage of water for drinking purposes in an open reservoir. A covered reservoir is necessary to prevent the access of light, rain, bird droppings, animals, insects, dust, etc. If light gains access the water is liable to become infected with green algae.

Secondly, no surface water can be considered entirely satisfactory if not carefully filtered before distribution. Wire gauze arrangements are not sufficient to prevent the lower forms of animal and vegetable life getting into the mains and, at certain periods, there will generally be complaints of disagreeable odours.

In August 1923, complaints being made regarding the water from the reservoir a sample was obtained from the Public Works Department for chemical examination It is unfortunate that a bacteriological examination could not have been made at the same time as it is now generally agreed that, for sanitary purposes, a bacteriological examination is more important than a chemical analysis. The sample of water in question was found to contain a considerable quantity of fine green algae and on chemical analysis gave the results shown in the table above under date 3rd August. As the figures obtained for the ammonias and oxygen absorbed differed so much from previously recorded analyses of the same water, a further lot of samples were obtained from the source and the reservoir. The results of these analyses are recorded in the table under date 12th August. From the results obtained it was concluded that the trouble was due to the condition of the reservoir. Accordingly it was recommended that the reservoir should be thoroughly cleaned as soon as possible. Owing to the drought this could not be done at once, but as soon as it was possible to undertake it the water returned to its usual high standard of quality. Owing to the absence of filter beds considerable numbers of crayfish were found in the reservoir. Many of these, without doubt, find their way into the town pipes where they decay and give the water a disagreeable odour so often complained of.

THE COMBUSTIBILITY OF TOBACCO.

The burning quality of smoking tobacco is one of its most important properties. Unsatisfactory burning renders it practically useless for the manufacture of cigars, cigarettes or pipe tobacco. If a tobacco burns well less narcotic products are produced than if it burns badly and so it is free from 'rankness' which is due to the presence of large quantities of protein matter in the leaf.

IMPORTANCE OF SOIL AND CLIMATE IN TOBACCO GROWING.

Difference in soil and climate may cause changes in the composition of the tobacco plant which make it more or less valuable or even useless for the purpose for which it was grown. For example, great differences in composition are found to exist between Turkish tobacco grown in Turkey and the same variety grown in California and between Cuban tobacco grown in Cuba and the same variety grown in Florida.

In the establishment of the cigar industry of Jamaica it was not until Messrs. Soutar obtained a correct analysis of the soil of the Vuelta Abajo district in Havana, together with a record of the temperature and other meteorological phenomena that they met with any degree of success. Only after many experiments were they able to secure a property having all the required conditions. Even in such a famous tobacco region as Cuba tobacco of good quality cannot be grown in the immediate vicinity of the ocean or in certain parts of the island even on what would otherwise be considered good tobacco lands. This has been the experience also ih Sumatra.

An important characteristic of the tobacco plant is its unusually high ash or mineral content varying from 15% to 35%, but averaging about 20%. This is more than double the usual ash percentage for the more common crops. This fact is undoubtedly responsible for the extreme suspectibility of this plant to variations of soil and climate.

Investigators at the Ohio Experiment Station have found that liming the soil lessens the amount of potassium and phosphorus in the tobacco, that potassium sulphate improves the burning qualities, whereas potassium chloride produces tobacco of poor burning qualities. The same station also found that the tobacco fertilized with manure contained large qualities of chlorine, but this did not seem to impair the burning qualities. The aroma and flavour were somewhat improved in the tobacco from soil treated with acid phosphate.

V. Graham and R. H. Carr of Purdue Unversity have noted that although the changes caused by fertilizers were considerable, they were of minor importance when compared with those affected by growing the plants on a different kind of soil or in a different climate and arrived at the conclusion that the final product seems to be the resultant of a series of factors and is not to be determined by the presence or absence of any constitutent.

Tobacco grown in St. Kitts.

During the past two years experiments with tobacco have been carried out in St. Kitts. It has been found that one of the chief defects of this tobacco is that it does not burn satisfactorily. The following ash analyses have therefore been made on samples of tobacco grown at different stations in the island to ascertain the mineral composition of the plants andto see if this defect could be satisfactorily explained. For comparison, an analysis of a Sumatra wrapper tobacco imported from the United States is included. This wrapper burns very freely.

	La Guérite, 1922.	La Guérite, 1923.	Milliken.	West Farm Mountain.	Sumatra Wrapper.
	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
Potash	9·85	4·25	7·21	8·17	37·32
Soda	·97	1·10	2·36	3·47	·96
Lime	46·03	49·32	49·88	39·53	36,79
Magnesia	12 82	17·47	8·74	16·87	8·43
Iron and Alumina ...	2·54	2·73	2·37	7·76	3·54
Phosphoric Acid ..	2·76	5·07	9·18	2·77	4·56
Sulphuric Acid ...	4·95	3·75	5·18	4·18	5·27
Silica	1·40	3·03	2·41	2·71	·93
Chlorine	18·69	13·29	12·70	14·53	2·20

The above figures have been calculated for the ash free from sand and carbon dioxide.

An examination of the above figures will show that the Sumatra tobacco contains about five times as much potash as the St Kitts tobacco and only about one sitxth of the chlorine.

Relative to certain investigations carried out on various kinds of tobacco grown in Japan, Fesca and Imai state, inter alia, that bases, particularly potash and lime, in medium quantity are favourable to the good quality and especially the combustibility of tobacco. An excess of either of these bases over a liberal mean percentage is neither a sign of good quality or combustibility. Mineral acids in large quantities indicate both bad combustibility and quality, but only a very high proportion of an Individual acid can be safely considered a decidedly bad indication. The combustibility is influenced to the greatest extent by the quantity of sulphuric acid and in a diminishing degree by the percentage of chlorine, phosphoric acid and silica in the tobacco. High basicity of ash is an excellent indication of good combustibility especially when not due either entirely or to a great extent to magnesia or iron.

It will, therefore, be realised that the burning properties of tobacco depend largely upon the nature of its mineral constituents. The ratio of potash to chlorine seems to be important. For satisfactory burning the potassium content should be at least ten times that of chlorine. The process of fermentation has very little effect on the burning quality of a tobacco, as the mineral constituents remain practically unaltered by this process. Fermentation is only of secondary importance until suitable soil and climatic conditions are found, whereby the plant will be enabled to produce a leaf of satisfactory mineral composition. It is evident from the analyses given above that such conditions do not exist at the stations in St. Kitts where the experimental cultivation of tobacco has been undertaken.

As no fertilizer experiments with tobacco have ever been carried out in St. Kitts it would be worth while ascertaining whether any improvement could be effected in the quality of the tobacco by the use of fertilizers.

Liming Experiments at Molineux Estate, St Kitts, in 1923.

In 1923 field experiments were laid out on Molineux estate to obtain data on the practical results of dressings of lime to the soils of St. Kitts. The crop experimented with was sugar cane. This experiment was referred to in the report of the agricultural department for 1922-23. The following account records the yields of sugar cane reaped from the different plots and the results of analyses of the soils of the plots. Certain deductions which it appears permissible to draw from the results of the first year's work, are also included.

PLAN OF THE EXPERIMENT.

The experiment was laid out in a 12 acre field on which yams had been grown the previous season The land sloped gently from south to north. No application of pen manure had been made to this field since 1918, but a fairly heavy dressing of organic matter was left on the land after the yams had been reaped. This was ploughed in some time before the canes were planted. Each plot was 1/16th of an acre in area and contained four rows of sugar cane. Between each plot there was a row of cane which received no application of lime. The rows extended from east to west. Each experiment was laid out in duplicate.

In December 1922 samples of soil and subsoil were taken from this field and the results of the laboratory examination are recorded in the report for 1922-23. For convenience of reference these results are summarised below. The soil is a sandy loam with a very low retentive power for moisture. The content of nitrogen was found to be 0.126 per cent and the organic matter 1.79 per cent. The reaction, determined by the colorimetric method of Gillespie, indicated that the soil was slightly acid, pH 6.7. There was a deficiency of calcium carbonate only 0.01 per cent being found. Fair quantities of other easily decomposable calcium compounds were found to be present in both soil and subsoil. The soil when treated with a 0.024N solution of calcium bicarbonate absorbed 0·162 grams of calcium bicarbonate per 100 grams of air dried soil.

The amounts of lime used in the experiment are given below :

Plot No. 1	...	...	No lime
„ No. 2	...	...	10 cwt. lime per acre
„ No. 3	...	...	20 „ „ „ „
„ No. 4	...	...	30 „ „ „ „
„ No. 5	...	...	40 „ „ „ „
„ No. 6	...	...	50 „ „ „ „

The lime used was burnt locally from Brimstone Hill limestone. Unfortunately no analysis was made of the material used in the experiment, but there are many analyses on record of samples of lime produced by the dealer from whom the lime was purchased. The slacked lime produced in St. Kitts contains from 54% to 63% of calcium hydroxide and from 25% to 33% of calcium carbonate. Small quantities of iron and magnesium are present.

The canes were planted in February 1923 and the lime was applied at the end of the same month. The present method of applying lime to the land can hardly be regarded as satisfactory. The lime is put on the land by labourers with baskets. Applied in this way it is not possible to get the material evenly distributed on the land and thoroughly incorporated with the soil. The use of some form of manure distributor is necessary for the satisfactory application of lime.

RESULTS OBTAINED.

The canes were reaped in May 1924. As it was impossible to weigh all the canes from any single plot, one row of each plot was weighed and from this weight the yield in tons of cane per acre has been computed.

The yields of the different plots are given below :

No. of Expt.	Manure per acre. *as Nitrate of Soda.*	Yield in tons of cane per acre.	Mean	Diff. in tons per acre over no lime.	Per cent gain over no lime
1	Nitrogen 36 lb. (1)	26·0			
	No lime (2)	30.3	28.2	—	—
2	Nitrogen 36 lb. (1)	34·4			
	10 cwt. burnt lime (2)	29.1	31.8	3·6	+13
3	Nitrogen 36 lb.				
	20 cwt. burnt lime ...				
	(1)	33·7			
	(2)	28·6	31.2	3·0	+11
4	Nitrogen 36 lb. (1)	33·7			
	30 cwt. burnt lime (2)	30.1	31.9	3·7	+13
5	Nitrogen 36 lb. (1)	35·8			
	40 cwt. burnt lime (2)	33·7	34.8	6·6	+23
6	Nitrogen 36 lb. (1)	33·1			
	50 cwt. burnt lime (2)	33·9	33·5	5.3	+19

The above data are not sufficient to enable one to come to any definite conclusions. but it is hoped to obtain further information next year when the ratoon canes are reaped from these plots.

Samples of soil were taken from each of the plots after the canes had been reaped and have been submitted to chemical examination in the Laboratory The results are tabulated before :

No. of Expt.	Manurial treatment per acre.	Nitrogen Per cent.	Humus Per cent.	Calcium Carbonate Per cent.	Reaction pH.
1	Nitrogen 36 lb.	(1) 0·116	2·14	0·01	6.5
	No Lime	(2) 0·100	1·97	0·01	6·6
2	Nitrogen 36 lb.	(1) 0·094	2·22	0·05	6·6
	10 cwt. burnt lime	(2) 0·101	1·99	0·05	6·7
3	Nitrogen 36 lb.	(1) 0 101	2·23	0·03	6·9
	20 cwt. burnt lime	(2) 0·104	2·03	0·05	6·7
4	Nitrogen 36 lb.	(1) 0·094	2.02	0·06	7·1
	30 cwt. burnt lime	(2) 0·095	2 44	0·08	7·0
5	Nitrogen 36 lb.	(1) 0·097	2·03	0·05	7·5
	40 cwt. burnt lime	(2) 0·090	2.46	0·06	7·1
6	Nitrogen 36 lb.	(1) 0·097	2.24	0·06	7·7
	50 cwt. burnt lime	(2) 0·095	1·82	0 07	7·3

These data show that there has been no appreciable change in the humus and organic nitrogen contents of the different plots; as would be expected the applications of lime have tended to give the different plots an alkaline reaction.

As applications of lime are known to render the reserves of potash and phosphoric acid in the soil more available to the plant, the following figures

showing the phosphoric acid content of the juice of canes reaped from the plots are interesting. The phosphoric acid was determined volumetrically by means of uranyl acetate solution.

No. 1	...	...	0·012 per cent., [P_2O_5]
No. 2	...	...	0·018 „ „ „
No. 3	...	...	0·018 „ „ „
No. 4	...	...	0·020 „ „ „
No. 5	...	...	0·028 „ „ „
No. 6	...	...	0·024 „ „ „

As observations in other cane growing countries have shown that the cane plant is more or less indifferent to soil reaction within certain limits, it is hardly likely that the change brought about in the reaction of the soil solution by applications of lime to St. Kitts cane soils will have any direct effect on the yield of sugar cane. The point must not be lost sight of, however, that applications of carbonate of lime to some of our soils might bring about increased yields, as the lime may be functioning not as a correcter of acidity but as an easily available source of calcium which may be necessary for the satisfactory nutrition of the cane plant. The possible effects of lime on the reserves of potash and phosphoric acid in the soil have already been referred to, and in this connexion the figures given above for the amount of phosphoric acid in the juice are suggestive. It is hoped that it may be possible to give these two problems the attention they deserve.

PHOSPHORIC ACID IN CANE JUICES.

During the year the amount of phosphoric acid in the juice of certain of the cane varieties under experimental cultivation was determined and the results are shown below. The volumetric uranyl acetate method, described by H. Walker, Industrial and Engineering Chemistry, February, 1923, was used in the determinations.

PLANT CANES.

La Guerite	Phosphoric Acid [P_2O_5]
Variety	Per Cent
B.K. 15	0.054
B.K. 40	0.051
Seedling No. 6	0.056
White Transparent	0.051
B. 147	0.052
B.H. 10. 12.	0.052

PLANT CANES.

Douglas Estate	Phosphoric Acid [P_2O_5]
Variety	Per Cent
Ba. 6032	0.036
B.S.F.12.24.	0.021
Ba.7924	0.031
Hill Seedling	0.029
B.376	0.032
B.H.10.12	0.027

RATOON CANES.

Molineux Estate.	Phosphoric Acid
Variety	Per Cent
B.H.10.12	0.031
B.147	0.029
White Transparent	0 051
M.998	0.045
A.95	0.041
A.2	0.049

These figures show that the juices examined are fairly high in phosphoric acid and that the supply of available phosphoric acid in these particular fields at the three stations in question was sufficient for the needs of the crop. In Hawaii it has been found that the phosphoric acid in the cane juice varies quite uniformly with the elevation above sea level at which the cane is grown, the juices from fields nearest sea level being highest in phosphoric acid.

Moth Borer Investigation

The small moth borer (*Diatraea saccharalis*) has been recognized as a serious pest of the sugar cane in St Kitts for very many years. Although most of the planters in the island are aware of the damage done to the sugar cane crop each season by this insect, yet, strange to say, no definite methods of control are practised on any estate at the present time. In the past it appears that sporadic attempts were made by individual planters to control the moth borer but unfortunately such attempts have been abandoned many years ago and the moth borer continues its ravages from year to year and at the present time is only kept in check by its natural parasitic enemies.

Probably, the lack of interest shown by the planter in the work of the moth borer is the failure to realize the amount of loss which is sustained each year from the attacks of this insect. Holloway and Loftin, who conducted moth borer investigations in the United States, state that cane badly bored is found to be hard and dry making it difficult to grind. The growth is checked and the bored stalks are often blown down by a strong wind. The purity of the juice is lowered, the tonnage decreased and the sucrose content materially diminished. The eyes are destroyed in many cases, which lessens the value of the infested cane for seed. In order to bring this matter to the attention of planters with a view to urging on them the necessity of adopting some method of control, an attempt has been made this year to estimate the damage done by the moth borer on certain estates. In each field 100 stalks were examined, taken in five groups of 20 each at regular distances throughout the field. The number of stalks and the number of joints damaged were counted and the percentages calculated. In estimating the number of joints damaged every joint with a borer hole was taken as damaged. The following figures were obtained.

INFESTATION OF PLANT CANES.

	Stalks per cent.	Joints per cent.
Estate No. 1.	95	20·5
No. 2.	100	57·0
No. 3.	99	36·0
No. 4.	96	36·0
Mean ...	98	40

These figures reveal the fact that nearly every cane stalk examined showed borer infestation and that 40 per cent. of all the joints had been injured by the insect. It has also been ascertained from the managers of other estates, where it was not found possible to make counts, that the moth borer had done considerable damage during the year.

To try and arrive at an estimate of the actual loss of sugar to the planter, the canes which had 57 per cent. of joints infested were separated into infested and non-infested joints. These two lots were ground separately and the juice analysed.

	Juice from infested joints. Per cent.	Juice from non-infested joints. Per cent.
Total Solids	19·60	20·40
Sucrose	15·23	18·29
Glucose	1·32	·48
Purity	77·7	89 7
Glucose Ratio	8·6	2·6
Gums	.214	·139
Ash	1.22	·75

With an infestation of 40 per cent. of the joints about 1 per cent. of the sucrose in the juice is lost. This will result in a loss of about £2,000 on a crop of 10,000 tons of sugar. It would therefore be highly advantageous to planters to make some effort to reduce the destruction carried out each year by the small moth borer of the sugar cane.

The following summary of the control measures at present adopted in British Guiana has been included for the benefit of any planter who might desire to do something in this direction. These facts have been taken from "Notes on the small moth borers of sugar-cane in British Guiana" by L. D. Cleare (Bulletin of Entomological Research).

CONTROL MEASURES.

Collection of Egg-clusters and Larvae.

The method of control usually employed in British Guiana is that known as "cutting out." In this method a gang of children are employed to go through the field cutting, by means of sharp knives, the "dead hearts" caused by the moth-borer. Each shoot showing a dead heart is cut off close to the ground, opened, and the larva or pupa it contains removed and kept in a small tin until the end of the day, when they are counted and destroyed. The insects are paid for by the hundred, the rate varying slightly according to their prevalence, being usually about six cents per hundred. The number of individuals employed in this way varies considerably, both according to the prevalence of the insects and the interest taken in the work by the management, but a gang of fifty persons is in no way unusual. The children employed at this work become very skilful at it, and often earn as good wages as do adults engaged in more arduous labour.

Besides cutting out dead hearts those gangs invariably collect egg clusters with the object of stimulating parasites of the borer. These are kept in small tins and counted at the end of the day. Egg clusters are paid for at the rate of one or two for one cent. Each day's collection of clusters is kept in a separate tin labelled according to the day of the week, the cover of the tin being slightly tilted to allow of the egress of any caterpillars that hatch within the tin. Each tin is placed in a shallow pan containing a mixture of water and kerosene or molasses, so that any larvae that emerge from the tins will crawl into the liquid and be destroyed. It is advisable to have a few holes bored about the bottom of the tin to allow of a circulation of air and so avoid over dampness and the growth of mould. After four days the eggs are examined, and any that have turned black are kept as being parasitised, the remainder being burnt.

The parasitised clusters are then placed in cigarette or other small tins, and returned to the fields from which they were collected. The tins containing parasitised clusters are put out in the field in small wooden boxes, eight inches square, opened at one side and hooked upon a stake about four feet in length driven into the ground. The open side of the box should be away from the prevailing wind. Parasited clusters should remain in the field about five days, after which time the parasites will have emerged and the tin can be used for fresh supplies.

Parasitic Enemies.

The small moth borers have several natural enemies. In St. Kitts only the egg parasite *(Trichogramma minutum.)* is known at the present time, but if it was decided to undertake control measures seriously it would, no doubt, be possible to introduce larval parasites and pupal parasites from British Guiana.

REPORT OF THE AGRICULTURAL INSTRUCTOR, NEVIS,

FOR THE YEAR ENDED MARCH 31st 1924.

Work in the Nursery, and Distribution of Plants.

CONDITION OF GARDEN, NURSERY &c.

The ornamental border of Allamanda has, in spite of the dry weather, made fairly good progress and will in time form a very attractive hedge.

The border hedge of Bread-and-cheese has been kept regularly trimmed.

The stock of nursery plants haa been kept up but there is very little demand for plants.

The total number of ornamental plants and shade trees distributed from the Station during the year was 92, besides several thousand Bread-and cheese seedlings supplied to The Alexandra Hospital.

PLANT IMPORTATION.

There was only one consignment of seed received at the Station during the year under review and consisted of a packet of several varieties of Castor seed received from the Superintendent of Agriculture for the Leeward Islands.

PLOT EXPERIMENTS AT THE EXPERIMENT STATION.

Experiments have been carried out with various economic and food producing crops such as sweet potatoes, yams, onions, cassava, indian corn, ground nuts, castor seed and green-dressings.

Experiments on a larger scale were also carried out with Sea Island cotton castor seed, and indian corn on lands rented from Ward's estate.

Seeds and cuttings of the above crops were freely distributed to growers throughout the island. The following is a list of such distribution :—

Sweet potato	cuttings	21,000
Cassava	„	725
Onion slips		7,900
Cotton seed	lbs.	12,794
Indian corn	lb.	20
Tonkin peas	„	5
Ground nuts	„	nil
Onion seed	„	24
Lima beans	„	3
Castor seed	„	120
Bon-aviste beans	„	4
Eddoes	„	21
Bread and cheese seed		9

Plot A.

This plot was previously in Indian corn and "long peas". After these crops were reaped the corn stalk and pea bush were turned under and the plot planted in cassava on Dec. 15 1922.

The crop made a fairly good start but the dry weather later seriously affected the crop and only very poor returns were obtained. The parts of the plot near the hedge having given practically nothing and many of the plants here had died out.

The crop was reaped on Oct. 18, 1923, and the following table gives the result of the experiment :—

Variety.	Yield per plot.	Calculated yield per acre lb.
Braziers	38	3420
Black Stick	12	2160
French No. 3	60	3600
Red Greenaway	14	1260
Small leaf	28	2520
Sweet No. 2	12	1080
Blue top	18	1620

After the cassava was reaped the plot was planted in ten varieties of sweet potatoes, on Oct. 27 1923.

This crop met with fairly good weather and the yields obtained were fairly good. The following table gives the results of the experiment :—

Variety.	Yield per plot lb.	Calculated yield per acre lb.
Brass cannon	18	3240
Todd	143	8580
Pity the poor	15	2700
Spooner	30	5400
Caroline Lee	20	3600
Red Bourbon	19	3420
Red hen and chickens ...	15	2700
Hug-me-tight	25	4500
Harris	20	3600
Man France	20	3600

The crop was reaped on March 5 1924. The plot was prepared and planted in Mazzagua Guinea corn on April 3 1924.

PLOT B.

This plot was previously in selected cotton. After the cotton was reaped the plot was prepared and planted in eight varieties of sweet potatoes on January 19 1923. The crop was badly affected by the dry weather, and the returns were so poor as not to worth recording. The plot was planted in Clay peas on July 18 1923. This crop on account of the dry weather did very badly. The crop was turned under, and on November 9 1923 the plot was bedded and planted in onions. The onions did not do very well as the weather continued dry, and only very small onions were obtained. The crop was reaped on March 13 1924, and a return at the rate of 7080 lb. of onions per acre was obtained.

After the onions were reaped the plot was planted in Lima beans.

PLOT C.

The plot was previously in Bon-aviste peas. The bush was turned under and the plot planted in eight varieties of sweet potatoes on June 8 1923. The crop was badly affected by the continuous dry weather and the plot was practically replanted in the same varieties in October when the weather was more favourable. There was a great shortage of potato cuttings in the island and the plot was severely cut back to supply cuttings to growers. This seriously affected the yield. The crop was reaped on April 30 1924, and the following table gives the result of the experiment:

Variety.	Yield per plot in lb.	Calculated yield per acre lb.
Pity the poor	23	2070
Spooner	26	2340
Caroline Lee	30	2700
Red Bourbon	25	2250
Red hen and chickens ..	20	1800
Hug-me-tight	25	2250
Harris	37	2220
Man France	38	2280

PLOT D.

This plot was previously in sweet potatoes. After the sweet potatoes were reaped the plot was prepared and planted in castor seed 4 × 4 feet apart on March 21 1923. The germination was very bad and up to the middle of July the crop was not established. Some of the plants were bearing while other seeds sown in the plot at the same time were only then germinating. The spikes on the larger trees were allowed to mature and on October 15 1923, the bush was turned under as the crop was attacked by Red Spider (*Tetranychus*) and the Lace-wing bug. On October 20 the plot was planted in seven varieties of cassava. The germination was fairly good but the crop was severely attacked by the cut worm (Prodenia) during the month of November. The crop afterwards suffered from want of rain and very poor progress was made, and up to the end of March there was promise of only a very poor crop.

PLOT E.

This Plot was previously in Lima beans and eddoes. After the crops were reaped the plot was planted in eddoes on June 7 1923. The crop germinated fairly well but the dry weather came on and a large number of the plants died. The crop was supplied when the rains came in October, but the weather was entirely too dry for eddoes, and the experiment turned out a failure.

PLOT F.

This plot was divided in two. F. (1) was previously in Clay peas as a green dressing. The green dressing was turned under and the plot planted in selected cotton on April 5 1923. An account of the selection will be found on another page of this report under the head " Cotton Selection."

The old cotton was pulled off on October 19 1923, and the plot prepared for onions, along with the other half of the plot which was in Rouncivals. The onions were planted on October 28 1924. The crop did very badly chiefly on account of the dry weather and a severe attack of onion thrips. The crop was reaped on March 1924, and a return of 233 lb. of onions obtained being at the rate of 2,330 lb. per acre which is the lowest yield of onions ever obtained here.

PLOT G.

The plot was previously in yams, after the crop of yams was reaped Lima beans were planted in the plot as a green dressing on April 16 1923. The Lima beans was kept regularly weeded, and on June 1 1923, the plot was planted in six arieties of yams. The cuttings germinated fairly well, but the whole crop was later completely destroyed by the very long dry weather. On October 15 1923, the plot was planted in Indian corn. This crop too did very badly on account of the dry weather, and a severe attack of worms. After the crop of Indian corn was reaped, the plot was planted on February 19 1924 in selected castor seed. The germination was very poor on account of the dry weather, and the few plants that came up were stunted and not at all promising.

PLOT H.

This plot was previously in cassava. After the cassava was reaped the plot was bedded and planted in peanuts on June 20 1923. The germination was fairly good but on account of the dry weather, the crop did very badly, especially the part near the hedge. The crop was reaped on December 29 1923, and a return of only 481 lb. of nuts obtained, being at the rate of 4801 lb. per acre. After the peanuts were reaped the plot was planted in selected cotton on February 5 1924.

DEMONSTRATION PLOTS.

Experiments were again carried out this year on 5 acres of land rented from Ward's estate. Three acres were planted in cotton and the balance in Indian corn sweet potatoes and castor seed.

COTTON 205.

This plot was previously in cotton. The old cotton from last crop was pulled off and burnt, and the plot was gone over and all the old bolls and bits of cotton collected and also burnt. The plot was banked as in the past and preparations was completed by the end of February 1923. The plot was planted on March 12 1923. The seed used was obtained from last season's nursery plot. The germination was very good and the crop did fairly well up to the early part of April 1923, but from this time on the weather was most unfavourable. The plants were stunted from want of rain and there were hardly any over 1 ft. high when they began to form bolls. There was also a great deal of boll-shedding from the continuous dry weather.

The crop was slightly attacked by the cotton worm during the month of June 1923, but this pest was not troublesome this season.

The pink boll worm was discovered in the plot on June 28 1923. Counts were made at the same time and it was found that 4 per cent. of the bolls were attacked by this pest. This figure kept constant until the crop was practically all reaped. When the crop was being pulled off in October 1923, the pink boll worm was very much more prevalent and 32 per cent. of the bolls were found to be attacked.

Internal boll disease was present to an appreciable extent only towards the end of the crop.

Picking began on June 28 1923 and the crop was all reaped by Oct. 1 1923 and a return of 531 lb. of seed cotton obtained, being at the rate of 265 lb. of seed cotton per acre.

The crop was not kept for a second picking. on account of the prevalence of the pink boll worm, and by the end of October the cotton was all pulled off and burnt. The plot was cleaned up and prepared for castor seed.

Cotton 342.

This plot was previously in cotton. The old cotton was pulled off and burnt and the plot cleaned up as usual. The plot was banked as in the past and preparation was completed by the end of February, 1923. The crop was planted on March 11 1923 with seed from last season's crop. The cotton was planted 4ft. × 18 inches apart, instead of 4ft. × 2ft. apart as in the past. The seed germinated fairly well but the dry weather following seriously affected the crop; the plants were all stunted and produced very few bolls.

Picking began on July 5 1923 and by October 3 the crop was all reaped. A return of 470 lb. of seed cotton was obtained, being at the rate of 235 lb. per acre.

The crop was not seriously affected by any pests, and the low yield was entirely due to unfavourable weather.

The old cotton was pulled off and burnt during the month of October 1923, and Bonaviste planted as a green dressing on October 22 1923. The bonaviste germinated well but they were seriously damaged later by the cut worm (Prodenia.

On January 2 1924, the green dressing was turned under and the plot kept regularly farmed until February 5 1924 when the plot was planted in cotton of the type of No. 205.

The germination was fairly good but on account of the dry weather the crop is making very poor progress.

Castor Seed.

The plot was previously in cotton. After the cotton was reaped the old cotton bush was pulled off and burnt and the plot gone over and all bits of cotton and bolls also collected and burnt. The plot was then weeded and laid out in half acre plots, labelled B, C, & D. The castor seed in plot B was planted 4 × 6ft apart, those in plot C 4 × 5ft. apart and those in plot D 4 × 4ft. Two seeds were put in each hole.

The plots were all planted up by November 21 1923. The germination was good and the crop made rapid progress as the weather was favourable. The young plants, especially those near the borders were attacked by the cut worm, but the pest was kept in check by hand-picking. When the plant were about three weeks old they were thinned out to one in the hole. The plots were kept regularly farmed right up to reaping time.

Towards the end of December 1923, the plants began to blossom and picking began on March 8 1924.

Up to the early part of March, there was every promise of a good crop, but the dry weather came on which seriously affected the yield. Practically all the leaves fell off the plants and a large proportion of the spikes dried before the seed had matured, and many plants, especially those near the hedges were killed out.

Picking began on March 8 1924. The method adopted in reaping the crop was to cut off the whole spikes on which there was a fair proportion of dry capsules. After the spikes were brought in from the field, the capsules were removed from the stem with a knife, a bit of iron hoop, and spread out on the floor of the building, and bagged after 5 or 6 days.

The first crop was practically all reaped by the end of March 1924; and the following table gives the results of the experiment :—

Plot.	Yield per plot lb. unshelled seed.	Calculated yield per acre unshelled seed.
B ...	602	1,204
C ...	677	1,354
D ...	569	1,138

The crop is being continued for a second crop, but the weather has been most unfavourable and it would appear that only a very poor crop will be obtained.

The cost of growing the crop was £3. 17. 2 being at the rate of £2. 11. 6 per acre.

The price of shelled seed locally is at the rate of 2d per lb.

Hand-shelling was attempted but this method was found too expensive. A portion of the crop was however hand-shelled with the object of ascertaining the percentage of seed to shells, and it was found that from 60 to 65 lb. of seed were obtained from 100 lb. of unshelled seed.

Castor Seed.

This plot was previously in cotton. After the cotton was reaped the cotton bush was pulled off and the plot cleaned up, it was planted in castor seed 4 × 2 ft. apart, with the object of getting results from closer planting. The seeds were planted on Dec. 5 1923. The germination was fairly good, but from lack of sufficient rain the crop made very poor progress. The plants were not well developed and produced spikes with very few capsules. Up to the end of March 1924, only 8 lb. of unshelled seed were obtained; and it is not likely that a return of more than 400 lb. of unshelled seed per acre will be reaped.

Indian Corn.

This plot was previously in cotton. After the cotton was destroyed, the plot was prepared and planted in Indian corn on November 24 1923. The seed germinated fairly well but the weather following was dry and the crop made poor progress. The crop was also severely attacked by the corn worm, consequently only a very poor crop was obtained. The crop was reaped on March 8 1924, and a return of 280 lb. of corn on the cob obtained; being at the rate of 560 lb. per acre.

Sweet Potatoes.

This plot was previously in Rouncevals. After the crop of peas was reaped the plot was planted in sweet potatoes on Oct. 19 1923. The crop grew fairly well but it was several times cut to supply cuttings to growers. The crop was reaped by the end of March 1924, and a return at the rate of 2,598 lb. of potatoes per acre obtained.

Cotton Selection

Seeds from the best plants from last year's selection of the Types Nos. 2051, 2052, & 2053, were planted in plot F. on April 5 1923. The seed germinated well but the dry weather was very much against the experiment.

The plants were so stunted and carried so few bolls, that it was not worth while to select individual plants. The seed cotton from each type was however reaped and kept in separate bags to carry on next season's selection.

Work in Connection With Insect, and Fungus Pests and Their Control.

Sugar Cane

Mosaic disease of the sugar cane has been successfully kept under control. The disease was confined to the variety S. C. 12/4, and the estates and peasants plots on which this variety has been grown were frequently visited by the Agricultural Instructor and all diseased plants found were dug out, and when fields were being cut for seed, only absolutely healthy canes were selected and used. This work entailed a great deal of extra travelling on the part of the Agricultural Instructor, but it is gratifying to report that the disease is practically eradicated.

The moth borer was very much in evidence this season, probably due to the prolonged dry season. Growers were advised to discontinue growing Guinea corn in the neighbourhood of their cane fields.

The cane crop in certain parts of the island was attacked by a looper caterpillar and in the windward part of the island a fair amount of damage had been done to young canes by it.

Root Fungus (*Marasmus*) was observed in a few places, but this pest was not serious this season.

Cotton.

The cotton worm on the whole was not very severe this season except at a few places in the windward part of the Island where a great deal of damage had been done.

Leaf blister mite was more in evidence than it had been for some time pasts and it would appear that this pest is increasing.

The cotton stainer was not as plentiful this season as it had been last season,

The pink boll worm up to the end of the first picking was fairly mild in it. attack, and the crop from the early planting was all reaped without any appreciable loss from this pest.

The later planting and second crop was practically a failure on account of this pest.

From experience with this pest it is fairly certain that neither late planting nor a second crop could be counted on.

The cleaning up of the cotton fields, the store houses and the fumigation of cotton seed at the ginneries have been satisfactorily carried out, and so long as these measures of control are carefully carried out the pink boll worm will not seriously affect the first picking, provided all the cotton in the island is planted about the same time.

INSECTICIDES.

A supply of Paris Green was again put in stock by the local Government for the benefit of the smaller growers under the same arrangements as in the past. During the season 48 growers were supplied with Paris Green, and the total quantity supplied was 506 lb.

DISINFECTION AND FUMIGATION OF PLANTS AND SEEDS.

In accordance with the provisions of the Plant Protection Ordinance 13 consignments of seeds, consisting chiefly of vegetable seeds, were received at the Experiment Station for fumigation.

According to the discretion of the officer in charge, the materials used when necessary for treatment of these consignments are carbon bisulphide, corrosive sublimate and Bordeaux mixture.

Seven shipments of cotton seed amounting to 128 tons were made to Barbados. This seed was first fumigated at the ginneries as soon as it comes from the gin. It was again fumigated at Charlestown under the supervision of the Agricultural Instructor just before shipment. At Charlestown there are two fumigating houses, one with a capacity of 25 tons in bags, and the other 12 tons. The seed after being fumigated is taken directly from the fumigating house and shipped.

Experiments With Sugar Cane Varieties.

Experiments with the following varieties of sugar cane were carried out at Cane Garden estate in connection with the work at the Experiment Station:—

B. 376, Ba 7924, B.S.F. 12 (24), B.S.F. 12 (27) B.S.F. 12 (34), B.S.F. 12 (45), Ba 6032, Sc 12/4, B,K, 6, B.K. 12, B.K. 15, B.K. 19, B.K. 23, B.K. 40, Hill Seedlings, B.H. 10 (12), White Transparent.

The plot was planted on January 17 1923. The germination on the whole was fairly good, but on account of the very severe and prolonged dry weather, the plot gave very low yields.

The plot was reaped on May 19 1924. The highest yield was obtained from B.H. 10 (12) which yielded at the rate of 11.6 tons of cane per acre, followed by White Transparent with 10.6 tons per acre. The canes were cut and weighed in the field under the supervision of the Agricultural Instructor, and a sample of 50 lb was taken from each variety and sent to the Government Laboratory at St Kitts for analysis of the juice.

The results of these experiments are published in a separate report by the Government Chemist and Superintendent of Agriculture for the Leeward Islands.

Progress in the Chief Industries

Sugar.

The sugar industry is rapidly declining. The weather during the year was very much against the crop, and on some of the estates the crop was so poor that it hardly paid to reap it. The larger growers have practically abandoned the industry and most of the canes now grown are grown by peasants. Sugar was made on some of the estates, but on account of the bad condition of the machinery of the island a great deal of the crop is wasted.

As in the past a portion of the crop was shipped to the St. Kitts Factory, but serious losses were sustained by the shippers through lack of proper facilities for transporting the canes across to St. Kitts. With bad machinery on the one hand and bad shipping on the other, the sugar growers are faced with a very difficult situation, and the acreage under canes is becoming less and less each year.

The sugar industry had been of great value to the island in the past, and if more satisfactory means of disposing of the canes are not very soon arranged it would appear that the industry would die out altogether, which would be a great set back to the island.

The acreage under canes for next crop is about 400 acres. The crop has not made very great progress from lack of sufficient rain.

Cotton.

The acreage under cotton during the season under report was about 3,000 acres, of this a fair proportion was planted during the month of March 1923. The germination on the whole was fairly good, but the dry weather during the months of April and May seriously affected the crop. Many of the fields had to be extensively supplied, and in some parts of the island there was not sufficient rain for planting until the latter part of June. A spell of dry weather again followed and the whole crop was practically ruined, as the pink boll worm by this time had increased to a great extent, and in some fields 75 per cent. of the bolls were damaged by this pest.

The cotton worm was not severe in its attack this season except in the northern part of the island where some of the early fields were badly damaged during the month of June.

Picking began in the month of July and poor yields were obtained throughout the island, and the crop was practically all reaped by the middle of November. The return this season was the lowest on record being at the rate of 40 lb. of lint per acre.

The close season was fixed for the month of January 1924, and the cleaning up of the fields and ginneries had been satisfactory. A large acreage was planted during the month of February 1924. The seed germinated well, but the weather following was very hot and dry and the young crop made very poor progress.

The acreage under cultivation for next crop will be about 2,500 acres, which is 500 acres less than that of last season.

Coconuts.

There was no increase in the acreage put under coconuts during the year. The plantations continue healthy, but the bearing at Clifton's and Jones is somewhat disappointing. At Pinneys and Paradise the trees are still yielding fairly well, and the younger planting on these estates are making fair progress.

The crop reaped at Pinneys estate during the year ended Dec. 31 1923 amounted to 429,225 nuts, most of which were shipped to Liverpool, and New York markets. The remainder of the crop was sold locally or made into copra. The total amount of copra shipped from this estate during the year was 7 tons which was sold at good prices.

A small hot-air drier has been erected at Pinney's estate which is giving fairly good results.

Progress in Minor Industries

Onions.

Orders were received at the Experiment Station for 19 lb. of onion seed. The seed arrived during the month of October and was at once delivered to the growers.

The crop was planted during the months of October and November. The weather was very much against the crop and very poor returns were obtained.

The crop was reaped during the months of March and April and sold in the local market, but at low prices as there was a large supply of imported onions on the market at the time.

Provision Crops

The usual provision crops were grown, but on account of the dry weather very poor returns were obtained. The yam crop in particular was very bad. There was a great shortage of planting material during the months of October and

November and seed and cuttings had to be imported from the neighbouring island, on account of the dry weather and a severe attack of the cut worm (*Prodenia*) the crop did very badly and there was a shortage of ground provisions.

Castor Seed

During the months of November and December a fairly large acreage was planted in castor seed. The seed germinated fairly well, but the young crop was seriously damaged by the cut worm, and in the windward part of the island. a field of about 20 acres was completely destroyed by this pest. The fields were again planted but the dry weather came on and the crops did very badly.

At Bath Plain Estate 60 acres of land were prepared and planted in castor seed during the month of March 1924, under the supervision of the Agricultural Instructor. The weather was very much against the crop and at the time of writing the crop had not been established.

Castor seed is a crop that requires a fair rainfall during its early stage of growth and in the absence of which, it is almost impossible to get the crop started.

The planters at first showed very great interest in the crop but the results have been so unsatisfactory that they have practically given up the idea of continuing with the crop. About 200 acres were planted in castor seed during the year under report, but it is not likely that castor seed will again be planted on a large scale.

Live Stock.

There were no deaths from anthrax among the animals during the year, and the restrictions with regard to the export of animals were removed on June 15 1923, and the post of Inspector of Animals abandoned, but the Agricultural Instructor was directed to examine the herds occasionally and report any suspicious case to the Government Veterinary Surgeon.

The animals suffered a great deal during the dry months from lack of food and in-sufficient water, and they were many deaths especially in the southern part of the island.

The Kentucky Jack continues in good health and condition and has proved of great value to the island.

Mule breeding is extensively carried on in the island and those from mares sired by the Kentucky Jack are indeed fine animals.

Cattle breeding is also carried on to a fairly great extent and there are herds of very fine animals of the Mysore strain, chiefly at Maddens and Cliftons estates. The market for cattle is at present fairly stagnant.

The Pig Industry at Indian Castle has not proved a financial success, and will probably be discontinued.

EXTENSION OF INTEREST IN AGRICULTURAL MATTERS.

Exhibitions.

No Agricultural Show was held during the year.

Agricultural Education.

There are only three schools in the island at which there are school gardens, but no real work of value is being carried out on them.

Details of Administration

The usual correspondence in connexion with the Department and matters of Agricultural interest have been carried on. The following publications in addition to those from the Imperial Departmsnt of Agriculture, have been received and are hereby gratefully acknowledged :—Journal of the Agricultural Society, Jamaica, Report of the Local Department of Agriculture, Barbados ; Journal de la Station Agronomique, Guadeloupe ; Philippine Agricultural Review ; Report of the Experiment Station, Porto Rico ; Journal of Agricultural Research and Experiment Station Record, United States Department of Agriculture ; Journal of the Empire Cotton Growing Corporation.

REPAIRS TO BUILDINGS.

No repairs were done to the buildings at the Experiment Station during the year.

STAFF CHANGE.

There was no change of staff during the year.

OFFICIAL VISITS.

His Excellency the Governor visited the Station in November 1923. His Excellency showed great interest in castor seed.

Hon. A. E. Collens F.I.C. Government Chemist and Superintendent of Agriculture for the Leeward islands visited the island in October and again in December 1923. He inspected the experiment Station and visited several of the estates, discussing matters of agricultural interest with the planters.

Mr. F. R. Shepherd the Agricultural Superintendent St. Kitts-Nevis, visited the island several times during the year and gave valuable advice on agricultural matters in general. Professor Matz of the United States Department of Agriculture, visited the island in May 1923. He visited the Station and Old Manor estate, and at a meeting of the planters of the island, gave a short lecture on mosaic disease of the sugar cane.

METEOROLOGICAL RETURNS.

The total rainfall for the year 1923-24 was 29·22 inches which is 15·48 inches less than that of last year. Rain fell on 126 days during the year ; the heaviest fall recorded for any one day was 2.41 inches which occurred on October 16 1923.

The following tables show the monthly rainfall at the Experiment Station for the year under report, and for the past eighteen years.

MONTHLY RAINFALL.

Month.	Rainfall in inches.	Number of days on which rain fell.	Maximum fall on any one day.
April	2·04	7	·90 (3rd)
May	·45	5	·13 (18th)
June	5·62	13	2·06 (7th)
July	1·85	13	·38 (7th)
August	2·63	11	·44 (26th)
September	1·16	9	·25 (8th)
October	5·28	13	2·41 (16th)
November	1·23	7	·38 (23rd)
December	3·16	17	1·02 (2nd)
1924.			
January	2·46	17	·54 (6th)
February	3·29	13	·73 (19th)
March	·05	1	·05 (31st)
	29·22	126	

TEMPERATURE.

Readings on the maximum and minimum and the wet and dry thermometer are taken daily at 9 a.m. and at 3 p.m.

The mean monthly temperature was 83°·0 F. The minimum reading was 64° F., registered on January 31 1924, and the maximum, 91° F. on September 26 1923.

RAINFALL AT THE EXPERIMENT STATION, FOR THE PAST SEVENTEEN YEARS, 1906-1923.

Months.	1906. Ins.	1907. Ins.	1908. Ins.	1909. Ins.	1910. Ins.	1911. Ins.	1912. Ins.	1913. Ins.	1914. Ins.	1915. Ins.	1916. Ins.	1917. Ins.	1918. Ins.	1919. Ins.	1920. Ins.	1921. Ins.	1922. Ins.	1923. Ins.
January ...	3·28	3·22	2·58	3·86	5·21	6·38	3·84	7·18	3·40	4·40	4·53	1·39	2·18	2·22	3·71	5·84	1·75	1·51
February ...	2·22	2·32	1·70	3·46	3·82	2·78	·68	1·96	2·74	2·13	3·99	3·28	3·27	1·16	2·86	2·79	1·80	2·41
March. ...	1·71	1·23	7·16	·96	1·33	2·32	2·66	4·14	3·10	·28	2·19	2·57	2·75	1·33	1·25	3·86	4·71	5·42
April ...	2·49	1·08	2·18	2·72	·44	4·02	4·20	·81	2·52	5·65	·75	1·00	2·59	2·79	·02	1·40	3·33	2·04
May ...	3·49	3·30	4·24	1·62	1·08	1·08	·79	4·17	6·29	2·79	3·82	4·27	6·14	2·10	1·22	·82	1·95	·45
June ...	7·30	4·12	2·83	9·52	4·21	·92	2·51	2·23	2·65	2·52	2·07	6·73	2·02	2·29	2·22	·80	3·09	5·62
July ...	4·11	4·86	3·34	4·52	2·80	2·72	3·56	1·77	5·16	8·14	14·54	3·46	4·08	4·02	1·79	4·94	4·05	1·85
August ...	2·94	2·64	5·02	8·71	7·10	2·34	3·46	4·92	4·72	4·34	7·81	4·02	5·12	1·66	4·61	6·58	3·88	2·63
September ...	18·93	3·76	6·98	3·46	7·00	5·30	3·19	3·59	2·20	4·71	2·00	8·18	6·21	2·10	6·05	4·20	6·84	1·16
October ...	3·10	6·92	1·44	7·38	1·86	3·58	5·25	3·89	4·17	5·88	10·86	5·00	6·36	8·44	6·76	7·34	4·27	5·28
November ...	3·42	2·54	6·93	2·44	3·32	2·80	6·43	4·41	12·44	5·37	6·74	2·11	10·98	7·22	3·30	3·66	2·14	1·23
December ...	6·67	7·46	6·10	2·74	4·68	8·84	2·85	3·36	4·16	5·89	4·74	2·09	2·28	2·89	4·39	3·95	5·81	3·16
Totals ...	60·11	43·45	50·50	50·69	41·91	45·08	39·42	42·64	53·55	52·10	64·04	44·10	53·98	38·22	38·18	46·18	43·62	32·76

The average rainfall for the last eighteen years was 46·64 inches.

Publications on Sale

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Volume XV, No. 4.—Containing an account of the Proceedings of the West Indian Cotton Conference 1916.
Volume XVI, Nos, 1, 2, 3 and 4.—Containing Papers on General Subjects.
Volume VII, Nos, 1, 2 3, and 4—Containing Papers on General Subjects, especially cotton,
Volume XVIII, Nos, 1, 2. 3, and 4—Containing Tropical Agricultural College Committee's Report, and Papers on Miscellaneous Subjects.

PAMPHLET SERIES.

The folowing list gives particulars of the chef pamphlets issued by the Imperial Department of Agriculture that are still available :—

SUGAR INDUSTRY.

Seedling and other Canes at Barbados, 1900-4.
Seedling Canes and Manurial Experiments at Barbados.
in 1903-5, No. 40. in 1906, No. 44, in 1905-7, No. 49, in 1906-8, No, 59, in 1907-9, No 62, in 1908-10 No. 66. } price 6d each,
Seedling and other Canes in the Leeward Islands.
in 1900-1, No. 12. in 1901-2; No, 20, in 1902-3, No, 27. } price 2d. each.
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in 1908-9, No. 63, in 1909-10, No. 67—price 6d each
Manurial Experiments with Sugar-cane in the Leeward Islands.
in 1902-3. No. 30, in 1903-4. No. 39, in 1904-5 No. 42, in 1905-6. No, 47, in 1906-7. No. 51, in 1907-8, No. 57, in 1908-9, No. 61, in 1909-10, No. 68, } price 4d. each,
Sugar-cane Experiments in the Leeward Islands.
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